Dynamic Human-Centered Suit Design: A Computational and Experimental Method

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About Me

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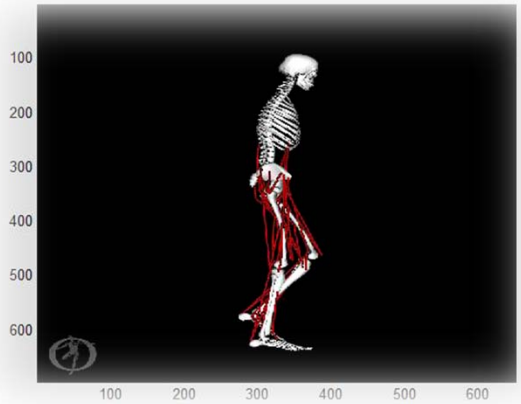

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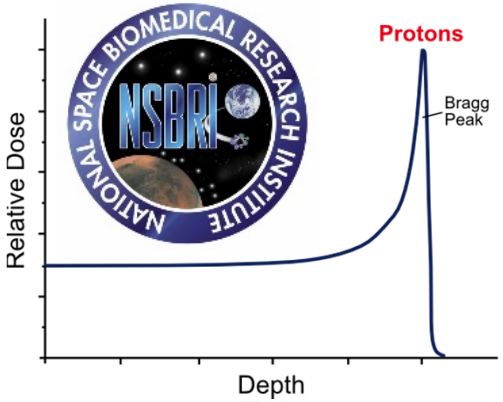


BROOKHAVEN NATIONAL LABORATORY

Background

Why does NASA fund PSS mobility/agility research?

Objectives of Internship

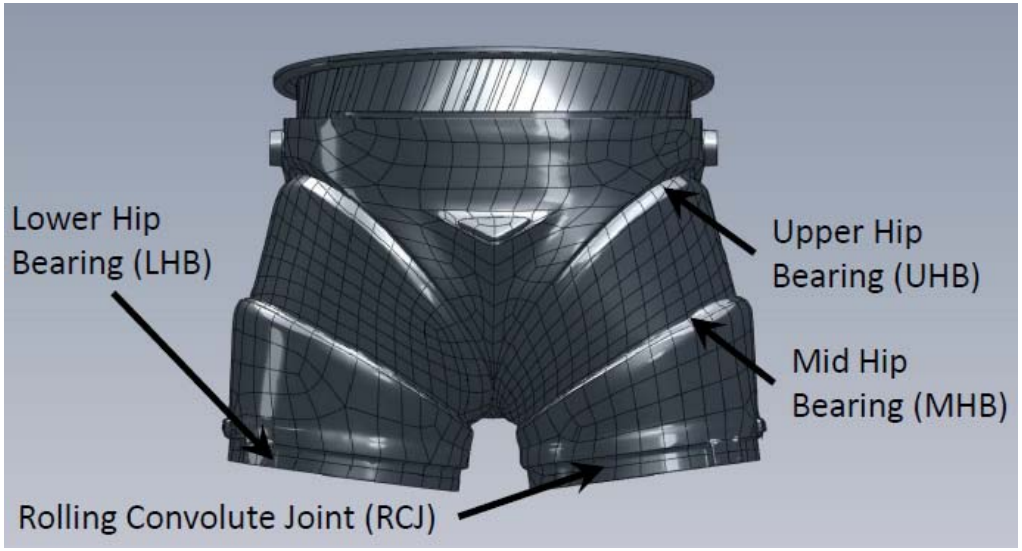
- Research & compare possible software packages for an analysis pipeline
  - Musculoskeletal Modeling (OpenSim, AnyBody, LifeMOD, SANTOS)
  - CAD (AutoCAD, SolidWorks, ProE)
  - FEM (ANSYS, Creo2, Abaqus)
- Obtain current CAD representations of the hip joint assembly
- Develop the CAD representation to include high fidelity information
  - Obtain and input complete component characterizations

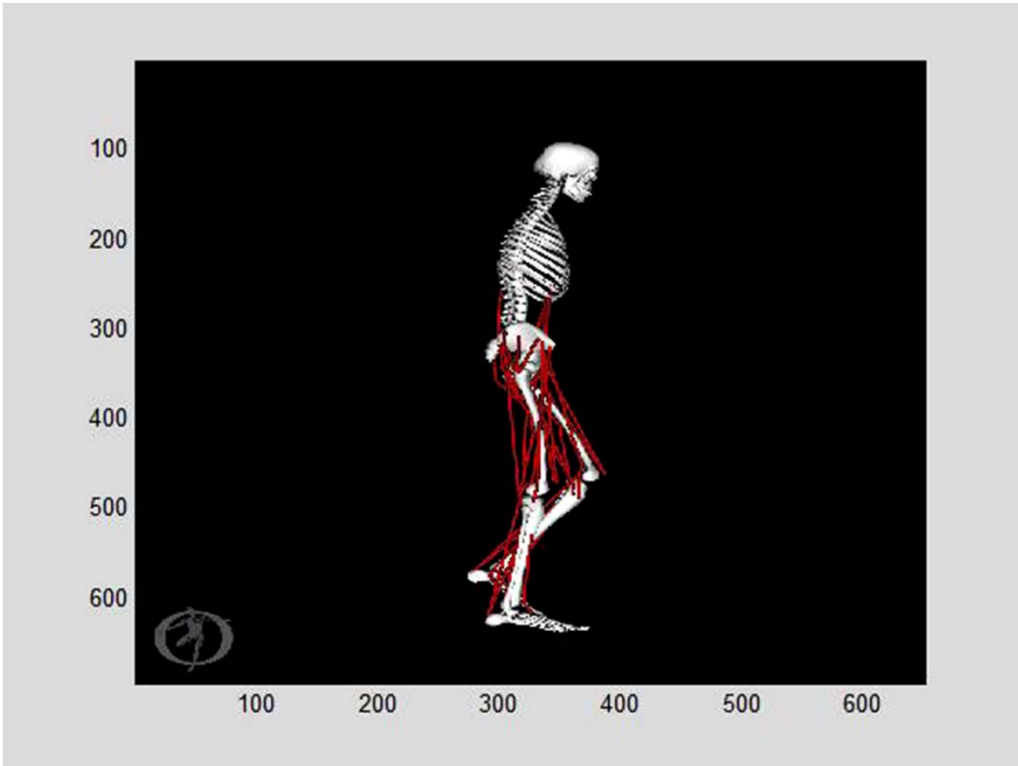
    material characteristics, composition, weight
  - Determine and input bearing characteristics - Force-displacement (time variant curves)

    Breakaway Force, steady state dynamics, and transitional dynamics
- Force plate gait test, fully suited, to obtain normal and shear force plate inputs for a musculoskeletal crewmember model

Methods/Procedures or Skills

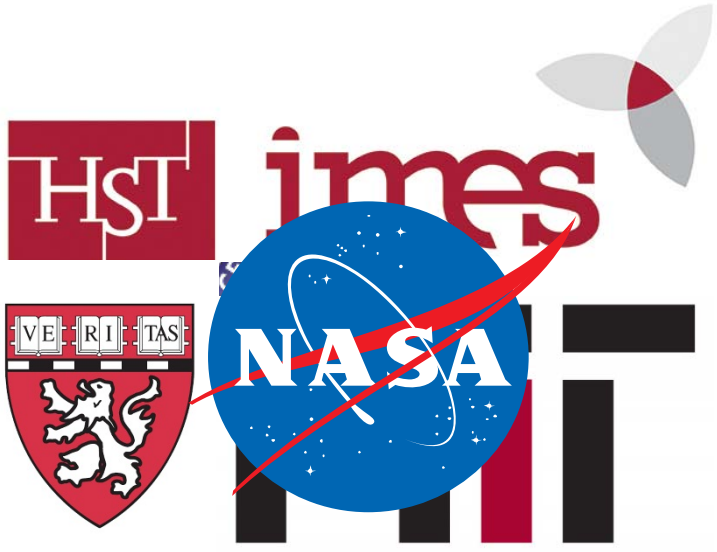
- Geometry Details - Bearing Experiment
  - Isolate Individual Bearing
  - Dynamometer: Constant V or F
  - Understand Response Profiles
  - Repeat for Each Bearing, 1-Side
- Crewmember Details – Mobility/Agility Experiment
  - Normal Gait: Suited vs. Unsuited
  - GRF & ROM: 6DOF Force Plates & Vicon Motion Capture Systems
  - Planetary Surface Motion: Kneel & Recover, Side Step, Walking Backwards





Surface Scans

Use .stl Stereolithography as FEA surface representations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